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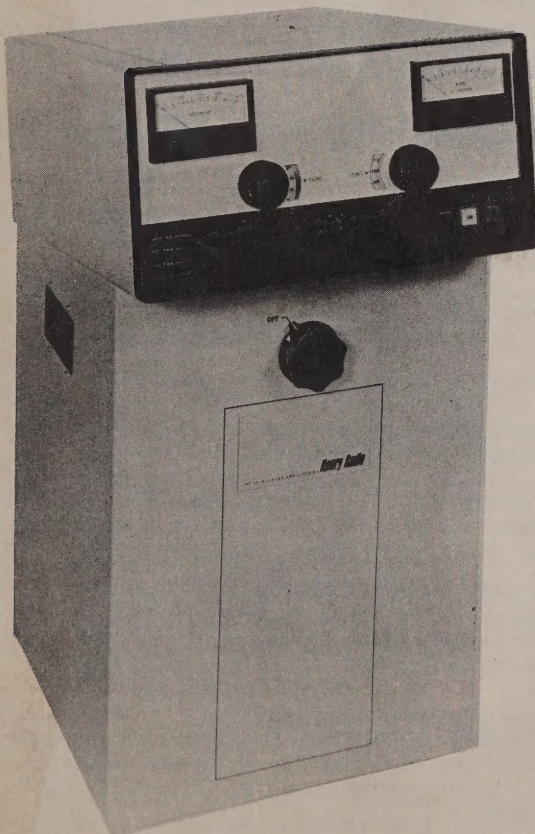
03-344

3.5 TO 30 MHZ  
3000 WATT PEP INPUT  
MILITARY - COMMERCIAL  
LINEAR AMPLIFIER

# HENRY 3K-A

*Bob Adams - Henry Radio  
Designer - Santa Barbara*

## OPERATING AND MAINTENANCE MANUAL



**Henry Radio**

11240 West Olympic Boulevard Los Angeles, California 90064 213/477-6701



## S P E C I F I C A T I O N S

### TYPE AND FUNCTIONS OF EQUIPMENT

The 3KA is a 3000 watt PEP input (2000 watt nominal output) linear amplifier, covering the 80 (6), 75 (5), 40 (4), 20 (3), 15 (2), and 10 (1) meter bands. Plug in input modules permit operation on any frequency from 3.5 to 30 MHz.

### TUBE COMPLIMENT

Two 3-500Z grounded grid triodes.

### FREQUENCY RANGE

(Standard Configuration)

Any frequency from 3.5 to 30 MHz by retuning the input circuits.

- 6 — 3.5 to 3.7 MHz
- 5 — 3.7 to 4.0 MHz
- 4 — 7.0 to 7.3 MHz
- 3 — 14.0 to 14.4 MHz
- 2 — 21.0 to 21.45 MHz
- 1 — 28.0 to 29.7 MHz

### TYPE OF EMISSION

SSB, AM, CW, FM, and RTTY.

### DUTY CYCLE

Continuous duty in all modes.

### POWER REQUIREMENTS

230 VAC, 2 or 3 wire, 30 amps, single phase.

### DRIVE POWER REQUIRED

SSB, CW, AM - 80 to 150 watts.

### INPUT POWER

3 kilowatts PEP SSB, 1 kilowatt AM,  
2 kilowatts CW, FSK

### OUTPUT POWER

2 kilowatts PEP minimum.

### PLATE POWER INPUT: SSB

Nominal average input of 2000 watts with speech. Distortion products are at least 30 db down from the signal.

### OUTPUT IMPEDANCE

52 ohms unbalanced with SWR not to exceed 2:1.

### INPUT IMPEDANCE

52 ohms.

### HARMONIC AND OTHER SPURIOUS RADIATION

Second Harmonic — -60 db  
Third order distortion — -30 db at full power out.

### NOISE LEVEL

-40 db or better below one tone carrier at 1 kilowatt.

### ALC CIRCUIT

Prevents overdrive from today's high power exciters and boosts average talk power.

### PROTECTIVE DEVICES

All removeable panels are interlocked. The input line is fused with 30 amp circuit breakers on each side. Electrical reset high voltage overload relay.

### METERING

Plate Meter — 0 - 1 amps plate current  
Multimeter — 0 - 4000 volts plate voltage  
Reflected Power  
Forward RF Power  
0 - 400 ma grid current

### FRONT PANEL CONTROLS

Band Selector — PA Load — PA Tune — Meter Switch: Plate Voltage, Reflected Power, Forward Power, and Grid Current — Power Switch: OFF, PRE-OP, CW, and SSB.

### REAR CONNECTIONS

RF Input, Antenna Relay, ALC, RF Output (PL-259).

### DIMENSIONS

32½" high x 16" wide x 20" deep.

### WEIGHT

167 pounds (185 lbs packed)



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## WARRANTY

Henry Electronics warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use, and service discloses such defect, provided the unit, or part, is delivered by the owner to us intact, for our examination, with all transportation charges prepaid to our factory, within ninety days from the date of sale to the original purchaser and provided that such examination discloses in our judgment that it is thus defective. Should a malfunction be suspected, write in detail to our service department for suggestions concerning the operation, repair or return of your unit if it should prove necessary.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory, nor in cases where the serial number thereof has been removed or defaced or changed, nor to units used with accessories not manufactured or recommended by us.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by Henry Electronics without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products.

Henry Electronics reserves the right to make any improvements to its products which it may deem desirable without obligation to install such improvements in its previously manufactured products.



## 3K-A OPERATING AND MAINTENANCE MANUAL

### SECTION 1 INTRODUCTION

The 3K-A is a one stage amplifier designed for SSB, CW, FSK, and AM operation on the frequencies between 3.5 and 30.0 MHz. The amplifier is a one piece floor console consisting of a complete RF deck and a power supply. The amplifier is supplied for operation from a 230 VAC, 2 or 3 wire, 30 amp, 50/60 Hz circuit.

### SECTION 2 INSTALLATION

#### 2.1 UNPACKING

Remove the amplifier from its carton and packing material and examine it for visible damage. If the unit has been damaged in shipment, save the box and packing materials and notify the transportation company. It is a good idea to save the box and packing in any case because they are expensive and very convenient when the amplifier is going to be moved. The two 3-500Z tubes and their chimneys, shipped in a second carton, must be installed before operating the amplifier.

#### 2.2 INSTALLATION OF THE 3-500Z TUBES AND CHIMNEYS

Remove the perforated top cover of the cabinet and the interior top shield, giving access to the interior of the RF deck.

Now put the 3-500Z tubes into their sockets. Next set the air system chimneys in place, making certain the pyrex cylinders are pushed down flush against the chassis and gripped on the outside of the glass by the spring clips mounted on the chassis. When the chimneys are in place, check that the formed tops of the chimney allow at least  $\frac{1}{4}$ " clearance from the envelope of the tube so that air can circulate freely from the bottom to the top of each tube for efficient air cooling of the tubes. Now fasten each plate lead to its appropriate anode connector. Remove the screw in the top of each anode connector on top of the tube and flex the parasitic choke and plate lead until the mounting hole in the plate is positioned directly above the screw hole in the anode connector. Insert the screw and hold the plate lead firmly while tightening the screw.

#### CAUTION

Do not exert too great a pressure or twist on the anode connection. Excessive pressure can cause a hairline fracture in the tube's glass envelope, destroying the tube. The tube pins are particularly delicate, and can easily break if the tube is not inserted and removed very carefully.

There are five cathode input plug-in modules corresponding to the six band positions, each labeled 10 (1), 15 (2), 20 (3), 40 (4), 75-80 (5 and 6), located in a line directly adjacent to the 3-500Z tubes. Check the modules to see that they are firmly seated in their sockets.

Replace the top shield but leave the outside cover off until the amplifier has been connected and tested.

#### 2.3 CABLING

**ANTENNA**— The coaxial antenna lead should be plugged into the SO-239 RF output connector on the rear of the amplifier. A PL-259 coax plug is provided in the accessory kit in case the antenna lead of the station does not have such a plug.

**INPUT**— The RG-58A/U input cable connects to the RF INPUT connector on the back of the amplifier. The other end of this cable is terminated by a phono plug and should be inserted in the RF output of the exciter. An adapter may have to be used if the exciter does not have a matching socket.

**ALC (Automatic Level Control)**— Plug the ALC cable into the phono socket marked ALC OUTPUT and into the ALC socket of the exciter. If the exciter does not have provision for feedback of ALC voltage from the amplifier, simply ignore the amplifier ALC socket and cable.

**RELAY**— The grey relay control cable should be plugged into the phono socket marked RELAY CONTROL on the back of the amplifier. This cable activates the amplifier to a transmit condition. It requires only a shorting relay contact to ground to be activated.



**CAUTION**

Do not apply any voltage to this relay control circuit. The amplifier's internal relay is activated by a self-contained 12 volt DC relay supply.

The relay cable can be plugged directly into the socket marked ANTENNA RELAY on the exciter. When the 3K-A is excited by a driver unit without an antenna relay socket it may be necessary to consult the circuit diagram of the exciter to find an available unused relay contact that is normally open in the receive condition and closed in the transmit condition. All current SSB transmitters and transceivers have a relay contact available for amplifier control, and most have the contact at a terminal board or jack on the back panel of the exciter.

**POWER**— The AC power cable is a three-conductor cable. The green lead connects directly to ground and the black and white leads connect to 230 volts, 50/60 Hz, at 30 amps. Select a three-prong plug that matches the power receptacle at the operating position and fasten the plug to the power cable. Be sure the 230 volts is applied to the black and white wires and the neutral lead is connected to the green wire of the power cable.

**CAUTION**

The amplifier may be damaged if the green wire is connected to one of the 230 volt power leads.

## **SECTION 3 OPERATION**

### **3.1 PRELIMINARY SETTINGS**

Set the band selecting switch to the desired band: 1 (22-29.7 MHz), 2 (16-22 MHz), 3 (10-16 MHz), 4 (6-10 MHz), 5 (3.8-6 MHz), or 6 (3.4-3.8 MHz).

Set the TUNE and LOAD controls, on the front panel, to the calibration readings for the selected frequency, as shown on the final test sheet at the back of the manual.

When the amplifier is turned off its internal relay automatically connects the output of the exciter directly into the antenna transmission line. With the amplifier off, tune the exciter to the desired frequency. Then switch the exciter to its standby condition.

Turn the 3K-A to PRE-OP momentarily, then to either CW or SSB. The TUNE and LOAD dials should be lighted, and the blower operating. Look down through the top shield to verify that the filaments of the 3-500Z tubes are lighted and place your hand directly above each tube to make certain air is circulating in the cooling system

**NOTE**

The 3K-A selector switch has a PRE-OP position (Pre-operational, step-start) to protect the amplifier from turn on voltage transients and current surge. Do not attempt to operate the amplifier in the PRE-OP position.

Set the multiswitch to the VOLT X 10 position. With the POWER switch turned to CW, the multimeter reading should be between 250 and 280, indicating a plate voltage of 2500 to 2800 VDC. Set the switch to SSB. The multimeter should indicate from 3300 to 3600 VDC.

Set the POWER switch to the CW position. With no drive applied, switch the exciter to its transmit condition. With normal line voltage the plate ammeter should indicate from 90 to 120 ma resting current. Set the switch to SSB. Resting current should be from 170 to 220 ma.

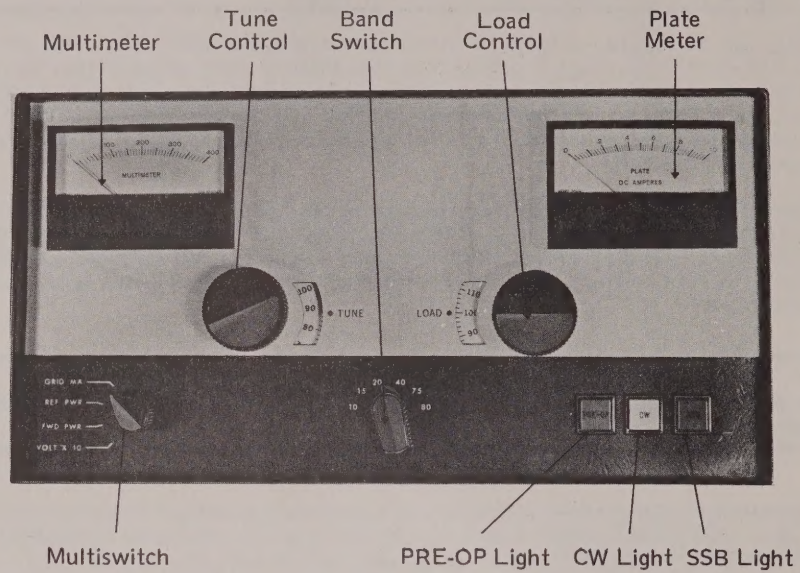
**NOTE**

The 3-500Z tubes should show color, glowing a dull cherry red with 400 ma plate current, and possibly a bright orange at 800 ma. When so operated, the tubes are well within their rated operating limits and no damage will result, provided the plate current has been dipped to a minimum reading using the TUNE control. Do not operate the tubes with 800 ma current in an off-resonance condition, and do not operate the tubes with 400 ma for long periods of time in an off-resonance condition. Depending on the line voltage at 1 kilowatt output, the plate current will be between 650 and 800 ma.

### **3.2 TUNING PROCEDURE Tune the 3K-A in the CW position only.**

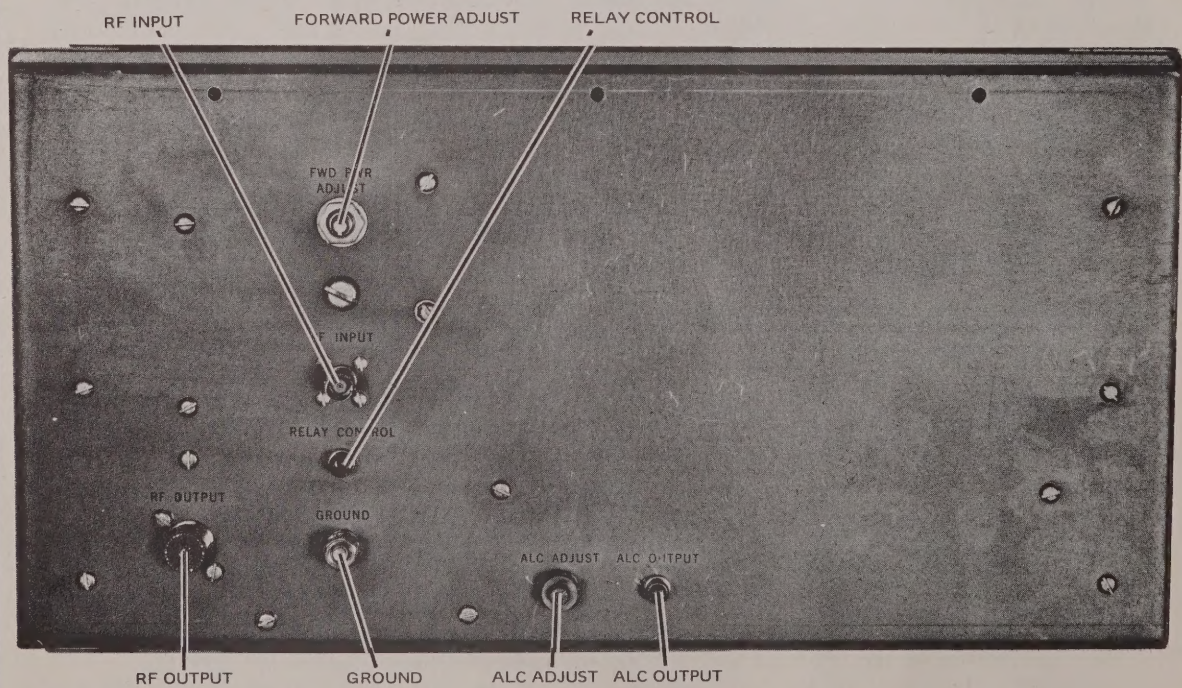
Set the multiswitch to the GRID MA position. With the exciter set for zero RF output, press the push-





The power-mode switch and the circuit breaker-fuse door are located on the front of the power supply wraparound.

**FIGURE 1.** 3K-A Front Panel Controls



**FIGURE 2.** 3K-A Rear Panel Controls.



to-talk switch of the exciter, causing the exciter and 3K-A to be in the transmit mode. The plate meter should show a resting plate current between 90 and 120 ma. Gradually increase the RF output of the exciter until the multimeter indicates grid current of 100 to 125 ma.

Adjust the TUNE control for the lowest dip. The minimum meter reading indicates resonance.

If the LOAD control is properly set, the plate current will read 400 ma. If the plate current is less than 400 ma, increase the load slightly by moving the LOAD control for a lower number reading. If the plate current is more than 425 ma, decrease the loading slightly.

Be sure to redip the TUNE control each time the LOAD control is changed. The resonance point of the TUNE control is affected by any change in the setting of the LOAD control.

Check that the GRID MA reading on the multimeter is 100 to 125 ma. If the grid current has changed, readjust the output of the exciter until the grid current reading is 100 to 125 ma.

### NOTE

This series of tuning and loading adjustments may have to be repeated several times until the desired readings of 100 to 125 ma grid current and 400 ma plate current are obtained. This reading should be  $\pm 10\%$ . The higher the frequency, the more precisely the load and tune adjustments must be made. Conversely, the lower the frequency, the broader the adjustments can be made.

In the reduced drive condition (grid current of 100 to 125 ma, and plate current of 400 ma) the plate meter dip is sluggish if the LOAD control is at an overcoupled setting. Should there be any difficulty in determining the dip point, turn the LOAD control counterclockwise to obtain less loading, permitting an easier determination of the dip point. The LOAD control can then be increased by rotating it clockwise, until the properly coupled condition of 400 ma is obtained.

## 3.3 VERIFYING PEAK POWER CONDITIONS

Set the power switch to the CW position and tune the 3K-A to any desired frequency. Increase the RF output of the exciter for a plate current reading of 800 ma. With the full drive the grid current should be about 280 ma.

## 3.4 ALTERNATE TUNING METHOD

When the TUNE and LOAD dial calibrations have been verified for each band and the operator feels comfortable with the amplifier, the entire tuning procedure can be completed in a few seconds.

This alternate method (tuning for maximum output) is done by applying RF drive from the exciter to the amplifier and then bringing the FORWARD POWER reading of the multimeter up to about two-thirds of full scale. Then adjust the TUNE and LOAD controls to peak the amplifier output reading as indicated on the multimeter. The 3K-A will now be properly adjusted for operation. With the power switch set to CW, single sideband operation should cause plate current peaks of about 400 ma, with grid current peaks of 50 to 100 ma. In the SSB position, plate current peaks about 600 ma and grid current peaks about 50 to 100 ma.

## 3.5 AM LINEAR OPERATION

To operate AM linear, the amplifier should be tuned and loaded as in Section 3, parts 3.1 and 3.2. The amplifier is in the CW position. For actual operation, the drive should be reduced to a 100 ma reading on the multimeter, set to the GRID MA position, where the linear will operate at 1 kilowatt input and about 350 watts AM linear output.

## 3.6 CW OPERATION

The 3K-A will operate CW at its full two kilowatt rating. Tune and load the amplifier with 250-280 grid ma and 800 ma plate current.

## 3.7 FSK OPERATION

The 3K-A is designed for continuous operation at 2 kilowatts input. For RTTY, adjust for 2 kilowatts input as described in part 3.6.



### 3.8 SSB OPERATION

With the exciter and 3K-A adjusted as described in parts 3.1 and 3.2, the voice peaks indicated on the PLATE meter should be about 400 ma under normal operating conditions. With the multimeter switch set to GRID MA, the multimeter should indicate peaks of 50 to 100 ma.

### 3.9 FORWARD POWER ADJUSTMENT

The FWD PWR ADJUST control, on the back panel of the 3K-A RF deck, has been factory preadjusted. If the FWD PWR reading on the multimeter is not near the full-scale reading when the 3K-A is properly tuned, the control can be recalibrated as follows.

Set the multimeter switch to FWD PWR and turn the FWD PWR ADJUST control fully counterclockwise.

Tune the 3K-A and its exciter as described in part 3.3. Then rotate the FWD PWR ADJUST control clockwise to obtain a full-scale reading on the multimeter.

### 3.10 ALC ADJUSTMENT

The ALC ADJUST control is on the rear panel of the RF deck. Should adjustment be necessary, proceed as follows:

Tune the exciter and the 3K-A to the 3rd band position for this adjustment. It is at the center of the frequency ranges for which the 3K-A has been designed.

Loosen the ALC ADJUST locknut and rotate the ALC ADJUST control fully counterclockwise.

With the output of the exciter at a normal level, with 280 ma grid current and 800 ma plate current, gradually rotate the ALC ADJUST control clockwise until grid current just starts to decrease.

### 3.11 POWER READINGS

The multiswitch has positions for forward power output (FWD PWR) and reflected power (REF PWR). After all previously described adjustments have been completed, the switch should be placed in the FWD PWR position and the FWD PWR ADJUST control rotated for a full-scale multimeter reading with low drive from the exciter. With no change of exciter output, and with the multimeter reading still at full scale, set the multiswitch to REF PWR. With a good antenna system there should be almost no reflected power. In no case should the 3K-A be operated into an antenna with a reflected power reading of more than 200. If there is any doubt concerning the SWR of the antenna, turn the 3K-A off and check the SWR with only the output of the exciter.

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## SECTION 4 PROTECTIVE SYSTEM

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### 4.1 PRIMARY CIRCUIT

A 30 amp circuit breaker is used to protect the primary circuit. Normally this breaker will not be tripped by a high voltage short because the overload relay will be tripped before the circuit breaker. However certain short circuit conditions in the power transformer or the primary circuit can occur in front of the overload relay.

### 4.2 HIGH VOLTAGE CIRCUIT

The high voltage circuit is protected by a reset relay. Any high voltage short will automatically trip the overload relay and light the red lamp. When this lamp is lighted, turn the selector switch to the PRE-OP position. Then press the reset button switch. The overload relay resets and the lamp goes off.

**INSIDE TRAP DOOR ON FRONT**

### 4.3 AC POWER CIRCUIT

The 3K-A uses 230 volts AC, 50/60 Hz, to power the filament supply and the relay power supply. This circuit is protected by two 3 amp fuses. **INSIDE TRAP DOOR ON FRONT**



#### 4.4 HIGH VOLTAGE SHORTING SWITCH

A high voltage shorting switch is located in the RF section. When the top shield is removed, the high voltage is shorted to ground.

### SECTION 5 SERVICE

#### CAUTION

Whenever it is necessary to remove the top shield from the power amplifier, make certain the high voltage is off. An automatic shorting bar will ground the high voltage when the top shield is removed.

#### 5.1 CALIBRATION OF THE GRID CURRENT

Turn the amplifier off, remove the top cover from the cabinet, remove the top shield from the RF section, and remove the junction box cover. Disengage the high voltage shorting switch. Disconnect the B+ from the RF section and the ground lead going to the negative side of D1.

Connect a calibrated reference meter, with a 0-500 ma scale, between the negative side of D1 and ground. Turn the amplifier on and adjust the driver output for a midscale reading on the reference meter. Apply drive for short periods of time, about 10 seconds at a time.

Compare the multimeter grid current reading with the reference meter. If the readings do not coincide, adjust the grid current meter adjustment, R13, located between the 3-500Z tubes, until the multimeter coincides with the reference meter. Turn the amplifier off, remove the reference meter, reconnect the B+ connection, and reconnect the ground to D1.

#### CAUTION

To operate the amplifier with the top shield removed, disengage the shorting bar from its center pin before turning on the high voltage. Do not make a practice of operating the amplifier with the top shield off and the high voltage exposed. Do so only for purposes of checking, adjusting, or servicing. EXERCISE CAUTION AT ALL TIMES.

#### 5.2 ADJUSTMENT OF THE OVERLOAD RELAY

A low voltage, variable, metered DC supply of 1 amp is needed for this adjustment. The 3K-A should stay off during this adjustment.

Connect the DC supply to the slider of R103 and to ground and increase the current of the supply to 1 amp. RY101 should trip. If the relay does not trip, adjust R103 until the relay trips at about 1 amp. When adjusting the overload relay, reset and check the overload current several times to get an average setting. R103 should be about 3 to 4 ohms.

#### 5.3 CALIBRATION OF THE PI-CATHODE INPUT MODULES

The 3K-A uses individual 50 ohm, to 50 ohm pi-cathode input matching modules to achieve low input SWR and maximum drive efficiency. These modules are labeled 10 (position 1 on the bandswitch), 15 (2), 20 (3), 40 (4), 75-80 (5 and 6).

The modules are individually adjusted at the factory for the center frequency on each frequency range. They are broadly tuned and will not normally need retuning. The units are plug-in and may be removed from their sockets for servicing.

If the amplifier is to be operated on a frequency very far from the tuned frequency, it may be advisable to retune the appropriate input module. To retune the module, place an SWR bridge in the drive cable between the exciter and the amplifier. Operate the amplifier in the normal manner to determine the SWR of the circuit.

If the ratio is higher than 1.5:1 loosen the lock nut on the input module to be adjusted and use an insulated alignment tool to adjust the tuning slug. Tune the slug until the SWR reaches minimum. The SWR will normally be less than 1.5:1. *Get lowest reflected-power reading on SWR meter.*



TABLE 1. TROUBLESHOOTING

| PROBLEM  | CAUSE  | REPAIR  |
|--|--|---|
| The amplifier does not come on when the selector switch is turned on.  | Improperly Connected AC line.<br>The 3 amp fuse is blown.<br>The overload relay is shorted.<br><br>The power switch is not closing.<br>The interlock switch is open.   | Reconnect the line properly.<br>Replace the fuse.<br>Check the relay with an ohm-meter.<br>Check it with an ohm meter.<br>Check it with an ohm meter.   |
| The amplifier turns on as soon as the cable is plugged in and will not turn off  | The selector switch is shorted or inoperative.   | Replace the selector switch section.  |
| There is no high voltage indication on the multimeter.   | The overload relay is tripped, as indicated by the red light.<br>The meter circuit is inoperative.   | Reset it by turning the selector switch to PRE-OP then press the red push-button switch.<br>Check the circuit for malfunction.  |
| No plate current indicated when the amplifier is on and the exciter is transmitting with no RF drive applied.  | The relay control cable from the exciter to the 3K-A may be bad.<br>RY1 may not be operating.<br>If the exciter operates RY1, suspect a poor contact by the center pole of the relay.  | Check the cable's continuity.<br><br>Check for component malfunction.<br>Burnish it and bend the relay center arm slightly to increase the closed pressure.   |
| The plate meter shows current as soon as the high voltage is turned on and the exciter is not transmitting.  | RY1 is probably actuating, showing a resting current of 150-100ma on the plate meter, caused by a short in the relay control circuit.<br>If RY1 is not actuated, suspect a grid-filament short in one tube.                                  | Unplug the relay control cable, if RY1 stays actuated the trouble is not in the exciter. Check the relay circuit.<br>Replace the tube.  |
| Excessive plate current.   | Bad tube or bad R106.<br>If one tube fails, it must be replaced before the 3K-A will operate. The filaments are operated in series resulting in a total filament supply of 10 volts at 15 amps, dividing to 5 volts at 15 amps at each tube. | Replace the tube<br>Replace R106.   |
| The 3K-A operates normally but no plate current shows.   | Bad meter circuit.   | Check the meter circuit for any malfunction.  |
| The overload relay will not reset.   | A high voltage short.<br>The resistance across the overload relay is wrong.  | Check the circuit. (See below)<br>Adjust R103 for a resistance of 3 to 4 ohms.  |
| An arc indicates a high voltage short:<br>Unplug the high voltage plug from the RF amplifier and exciter. If the short persists it is located in the power supply. | A power supply high voltage short.   | Check for visible evidence, an arc usually chars or blackens an area. Make an ohm meter check. Start with the filter condenser and check through the circuit toward the power transformer. Check interconnecting leads for a ground short. Check the filter choke and .1 mf resonating capacitor. Check the reverse resistance of D201-D204. When disconnected, good diodes have infinite resistance and bad diodes read less than 2 ohms resistance in either direction. |
| If the short is in the RF deck.  | An RF deck high voltage short.   | Check for visible evidence.<br>Make an ohm meter check.<br>Check the high voltage leads.  |
| The circuit breaker is actuated by a short.  | Shorted power transformer primary.<br>A shorted rectifier diode.   | Check for a short and replace.<br>Check with ohm meter as above and replace.  |
| No plate current and excessive grid current.   | Open high voltage circuit.   | Examine the circuit and repair.   |
| No grid current and the plate meter does not drive up.<br><br>Intermittant Grid current.   | Exciter malfunction.<br><br>Cable between exciter and 3K-A bad.<br>Bad socket connection in that cable.<br>Bad input module.   | Turn the 3K-A off, switch to FWD PWR, operate exciter to antenna and check its operation<br>Check cable continuity.<br>Repair the socket connection.<br>Operate on a different band to isolate the problem<br>Check the exciter output.   |
| Low grid current   | Low output from the exciter.   |   |



**CAUTION**

Exercise caution when adjusting the tuning slugs. THE HIGH VOLTAGE IS EXPOSED.

For frequencies midway between the frequency ranges, it may be necessary to order special input modules from the factory.

**5.4 TROUBLESHOOTING**

The 3K-A is designed with conservative, heavy duty components to offer years of trouble free operation. However, in the event of some trouble, Table 1 on the opposite page is included to help service the 3K-A.

If shipment of your amplifier to Henry Radio becomes necessary, be sure to pack the unit very carefully, preferably in its original packing carton. Be sure to remove the tubes and pack them in a separate package. The amplifier must be shipped prepaid. We recommend either motor freight or REA. When shipping motor freight, classify the unit as a power supply. Under no circumstances rate the amplifier as a radio, because such a rating can double the shipping costs.

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### **HENRY ELECTRONICS STANDARD WARRANTY**

Henry Electronics warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use, and service discloses such defect, provided the unit, or part, is delivered by the owner to us intact, for our examination, with all transportation charges prepaid to our factory, within ninety days from the date of sale to the original purchaser and provided that such examination discloses in our judgment that it is thus defective. Should a malfunction be suspected, write in detail to our service department for suggestions concerning the operation, repair or return of your unit if it should prove necessary.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory, nor in cases where the serial number thereof has been removed or defaced or changed, nor to units used with accessories not manufactured or recommended by us.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by Henry Electronics without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products.

Henry Electronics reserves the right to make any improvements to its products which it may deem desirable without obligation to install such improvements in its previously manufactured products.

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## SECTION 6. 3K-A PARTS LIST

| SCHEMATIC NO.     | DESCRIPTION   | NUMBER   |
|-------------------|---|----------|
|                   | Air Filter  | 56 00300 |
| B1                | BLOWER: <sup>220</sup> <del>115</del> VAC, 3000 RPM.        | 00 39085 |
| Box               | Accessory packing box for the 3K-A.                         | 57 02001 |
| Box               | Shipping box and packing for the 3K-A.                      | 57 00300 |
| C1 and C2         | CAPACITOR: Ceramic disc, .01 mf, 600 V, GMV.                | 08 06103 |
| C3 and C4         | CAPACITOR: Silver mica, 27 pf, 500 VDCW, 5%.                | 08 15270 |
| C5 and C6         | CAPACITOR: Silver mica, 110 pf, 500 VDCW, 5%.               | 08 15111 |
| C7                | CAPACITOR: Silver mica, 91 pf, 500 VDCW, 5%.                | 08 15910 |
| C8                | CAPACITOR: Silver mica, 82 pf, 500 VDCW, 5%.                | 08 15820 |
| C9 and C10        | CAPACITOR: Silver mica, 160 pf, 500 VDCW, 5%.               | 08 15161 |
| C11 and C12       | CAPACITOR: Silver mica, 150 pf, 500 VDCW, 5%.               | 08 15151 |
| C13 and C14       | CAPACITOR: Silver mica, 390 pf, 500 VDCW, 5%.               | 08 15391 |
| C14 and C16       | CAPACITOR: Silver mica, 360 pf, 500 VDCW, 5%.               | 08 15361 |
| C17 through C20   | CAPACITOR: Silver mica, 620 pf, 500 VDCW, 5%.               | 08 15621 |
| C21 through C26   | CAPACITOR: Ceramic disc, .003 mf, 1000 VDC, GMV.            | 08 00302 |
| C27 and C28       | CAPACITOR: Ceramic transmitting, 1000 pf, 5 KV, 20%.        | 08 85813 |
| C29A and C29B     | VARIABLE CAPACITOR: Tune, air, 20-145 pf, 4.5 KV.           | 09 15415 |
| C30 through C35   | CAPACITOR: Ceramic disc, .003 mf, 1000 VDC, GMV.            | 08 00302 |
| C36 through C39   | CAPACITOR: Ceramic disc, .01 mf, 600 V, GMV.                | 08 06103 |
| C40 and C41       | CAPACITOR: Ceramic disc, .1 mf, 50 V, 20%.                  | 08 00104 |
| C42 through C47   | CAPACITOR: Ceramic disc, .003 mf, 1000 VDC, GMV.            | 08 00302 |
| C48               | CAPACITOR: Ceramic disc, .0047 mf, 6000 VDCW, 20%.          | 08 60047 |
| C49               | CAPACITOR: Ceramic disc, .0022 mf, 6000 VDCW, 20%.          | 08 60222 |
| C50A and C50B     | VARIABLE CAPACITOR: Load, air, 350 pf.                      | 09 15410 |
| C51               | CAPACITOR: Ceramic disc, .01 mf, 600 V, GMV.                | 08 06103 |
| C52               | CAPACITOR: Feedthrough ceramic, 2000 pf, 500 V, 20%.        | 08 00202 |
| C53               | CAPACITOR: Ceramic disc, .01 mf, 600 V, GMV.                | 08 06103 |
| C54               | CAPACITOR: Feedthrough ceramic, 2000 pf, 500 V, 20%.        | 08 00202 |
| C55 through C58   | CAPACITOR: Ceramic disc, .01 mf, 600 V, GMV.                | 08 06103 |
| C59               | CAPACITOR: Feedthrough ceramic, 2000 pf, 500 V, 20%.        | 08 00202 |
| C60 and C61       | CAPACITOR: Silver mica, 47 pf, 500 VDCW, 5%.                | 08 15470 |
| C62 through C67   | CAPACITOR: Ceramic disc, .01 mf, 600 VDCW, GMV.             | 08 06103 |
| C68 through C70   | CAPACITOR: Ceramic transmitting, 100 pf, 5 KV, 20%.         | 08 85712 |
| C101              | CAPACITOR: Electrolytic tubular, 500 mf, 25 V.              | 08 01290 |
| C201              | CAPACITOR: Filter, Oil filled, .1 mf, 7500 V Test.          | 08 17500 |
| C202 through C207 | CAPACITOR: Oil filled, 4 mf, 3500 V.                        | 08 00151 |
| CB1               | CIRCUIT BREAKER: 30 amp, 230 VAC.                           | 12 00230 |
|                   | CABLE: 6', phono plug to phono plug ALC and Relay control.  | 04 25025 |
|                   | CABLE: 10', radio frequency coaxial cable.                  | 04 00010 |
|                   | CATHODE INPUT MODULES: Specify frequency.                   |          |
|                   | CATHODE INPUT MODULE SOCKETS: 4 pin.                        | 16 07804 |
|                   | CHIMNEY: Air cooling chimney for 3-500Z tubes, glass.       | 89 00400 |
| D1                | DIODE: Rectifier, 10 volts, 1.2 amp.                        | 73 00010 |
| D2                | DIODE: Silicon rectifier, axial lead, 400 PIV, 1 amp.       | 73 00157 |
| D3 through D6     | DIODE: Silicon rectifier, 1000 PIV, 1 amp.                  | 73 00509 |
| D101 and D102     | DIODE: Auto diode, 50 volts, 2 amps.                        | 73 00100 |
| D201 through D204 | DIODE: Rectifier, 15,000 PIV, 1.2 amp.                      | 73 15000 |
| D205              | DIODE: Cascading, transient suppressor, 240 VAC.            | 73 00240 |
| D206              | DIODE: Zener, 100 volt, 5 watt,                             | 73 05378 |
| Dial              | Tune Dial   | 36 00400 |
| Dial              | Load Dial   | 36 00401 |
| F1 and F2         | FUSE: 3 AG, 3 amp, 250 V.                                   | 24 30301 |
| Feet              | 3K-A feet, white nylon with 1/4" studs.                     | 36 00402 |
| Fuse Clip         | Beryllium Copper, 5 AG to hold D101 and D102.               | 36 00403 |
| Fuse Holder       | 3 AG, extractor post.                                       | 25 34204 |
| Gears             | 96 teeth, diameter - 1.5".                                  | 28 06496 |
| Gears             | 192 teeth, diameter - 3.0".                                 | 28 64192 |
| Gear              | 3K-A band switch gear.                                      | 28 00300 |
| Handles           | Black plastic cabinet handles.                              | 36 00404 |
| Hardware          | Write with a full description if any hardware is required,  |          |
| J1                | CONNECTOR: Coax connector, type SO-239/U.                   | 16 00239 |
| J2                | CONNECTOR: Low loss high voltage terminal and thru-bushing. | 16 37501 |
| J3 and J4         | JACK: Chassis jack, male, RF IN and ALC OUT.                | 16 35010 |
| J5                | CONNECTOR: Coax donnector, type UG-290A/U BNC.              | 16 00290 |
| Knob              | Band Switch Knob, black plastic                             | 36 00405 |



| SCHEMATIC NO.     | DESCRIPTION  | NUMBER   |
|-------------------|--|----------|
| Knob              | Multiswitch, black plastic.                                  | 36 00406 |
| Knob              | Power Knob, black plastic.                                   | 36 00300 |
| Knob              | Tune and Load Knob, black plastic.                           | 36 00407 |
| L1                | COIL: 10 meter cathode input coil.                           | 32 00401 |
| L2                | COIL: 15 meter cathode input coil.                           | 32 00402 |
| L3                | COIL: 20 meter cathode input coil.                           | 32 00403 |
| L4                | COIL: 40 meter cathode input coil.                           | 32 00404 |
| L5                | COIL: 75-80 meter cathode input coil.                        | 32 00405 |
| L6                | COIL: Silver flashed copper strap, parasitic choke.          | 85 22222 |
| L7                | CHOKE: Toroidal wound filament choke.                        | 85 11111 |
| L8                | COIL: Silver flashed copper strap, 10 meter coil.            | 32 11111 |
| L9                | CHOKE: Silver flashed copper strap, parasitic choke.         | 85 22222 |
| L10               | CHOKE: Radio frequency filter, 50 uh, 2 amp, 20%.            | 85 05240 |
| L11               | CHOKE: Plate choke, radio frequency wound on a teflon rod.   | 85 33333 |
| L12               | COIL: Tank coil, silver flashed copper tubing.               | 32 23255 |
| L13               | COIL: L-Section Coil, silver flashed copper tubing.          | 32 01608 |
| L14               | CHOKE: Radio frequency, 1.7-30 MHz, 1.0 mh, 500 ma.          | 85 02752 |
| L15               | CHOKE: Radio frequency, 2.5 mh, ferrite core, 160 ma.        | 85 06302 |
| L201              | CHOKE: 10 henry, 700 ma.                                     | 85 16327 |
| Light Sockets     | SSB, CW, and PRE-OP light holders.                           | 40 00215 |
| M1                | METER: Multimeter, 0-400 ma scale and 0-4000 V scale.        | 52 09990 |
| M2                | METER: Plate meter, 0-1 amp scale.                           | 52 09991 |
| Manual            | Operating and Maintenance Manual - 3K-A.                     | 92 00301 |
| Metal Work        | Write with a full description if any metal work is required. |          |
| P1                | PLUG: 11 pin CP plug w/shield.                               | 16 86011 |
| P2                | PLUG: 6 pin CP plug w/shield, Power Plug.                    | 16 00406 |
| Plate Caps        | Plate cooling cap for 3-500Z tubes.                          | 89 03506 |
| Plug              | Plug for connections to SWR Bridge.                          | 16 03504 |
| Power Cord        | 8', black 14/3, three wire cable.                            | 04 00143 |
| PL1 and PL2       | LIGHT: Dial pilot lamp, 12 volt, bayonet base.               | 40 18500 |
| PL3               | LIGHT: Reset light, miniature light assembly, 12 volt.       | 40 85802 |
| PL4 through PL6   | LIGHT SSB, CW, PRE-OP light assembly.                        | 40 00300 |
| R1                | RESISTOR: Vitreous, fixed, 500 ohm, 50 watt, 5%.             | 68 00500 |
| R2 through R5     | RESISTOR: Carbon, 10 ohm, 1/2 watt, 10%.                     | 68 40100 |
| R6 and R7         | RESISTOR: Carbon, 150 ohm, 2 watt, 10%.                      | 68 61500 |
| R8 through R11    | RESISTOR: Carbon, 10 ohm, 1/2 watt, 10%.                     | 68 40100 |
| R12               | RESISTOR: Carbon, 150 ohm, 2 watt, 5%.                       | 68 51500 |
| R13               | POTENTIOMETER: Wire wound, 250 ohm, 5 watt, GRID MA.         | 60 00251 |
| R14 and R15       | RESISTOR: Carbon, 150 ohm, 2 watt, 10%.                      | 68 61500 |
| R16 through R19   | RESISTOR: Carbon, 10 ohm, 1/2 watt, 10%.                     | 68 40100 |
| R20               | POTENTIOMETER: Wire wound, 10 K ohm, 1/2 watt, FWD PWR.      | 60 10100 |
| R21               | RESISTOR: Vitreous, fixed, 10 K ohm, 25 watt, 5%.            | 68 90103 |
| R22               | RESISTOR: Vitreous, fixed, 75 ohm, 10 watt, 5%.              | 68 80750 |
| R23               | POTENTIOMETER: Wire wound, 100 K ohm, type J.                | 60 01041 |
| R24               | RESISTOR: Carbon, 1 K ohm, 1 watt, 10%.                      | 68 20013 |
| R25               | RESISTOR: Carbon, 68 K ohm, 1 watt, 10%.                     | 68 20683 |
| R101              | RESISTOR: Heating Element.                                   | 68 00415 |
| R102              | RESISTOR: Vitreous, fixed, 5 K ohm, 10 watt, 5%.             | 68 80053 |
| R103              | RESISTOR: Vitreous, adjustable, 7.5 ohm, 25 watt, 5%.        | 68 00750 |
| R104              | RESISTOR: Vitreous, fixed, 5 K ohm, 10 watt, 5%.             | 68 80053 |
| R105              | RESISTOR: Carbon, 910 ohm, 1 watt, 10%.                      | 68 29100 |
| R106              | RESISTOR: Vitreous, fixed, 1 ohm, 25 watt, 5%.               | 68 90010 |
| R107              | RESISTOR: Carbon, 150 ohm, 2 watt, 10%.                      | 68 61500 |
| R108 through R111 | RESISTOR: Precision, 1 M ohm, 2 watt, 1%.                    | 68 00016 |
| R112              | RESISTOR: Carbon, 10 K ohm, 2 watt, 10%.                     | 68 60103 |
| R113 through R116 | RESISTOR: Vitreous, fixed, 20 K ohm, 100 watt, 5%.           | 68 00203 |
| R117 and R118     | RESISTOR: Carbon, 270 K ohm, 2 watt, 5%.                     | 68 52703 |
| RY1               | RELAY: 3PDT, 12 VDC, 10 amp, antenna relay.                  | 64 01025 |
| RY101A and B      | RELAY: Overload, DPDT.                                       | 64 00300 |
| S1A, B, and C     | SWITCH: Power switch assembly.                               | 76 00301 |
| S2                | SWITCH: Reset, SPDT push button, momentary action.           | 76 00903 |
| S3                | SWITCH: High Voltage shorting switch.                        | 76 22222 |
| S4                | SWITCH: Multiswitch, rotary, 4 position, 3 section.          | 76 32340 |
| S5A, B, C, D, E   | SWITCH: Band Switch assembly.                                | 76 11111 |
| SK1               | SOCKET: 11 pin male connector.                               | 16 78011 |

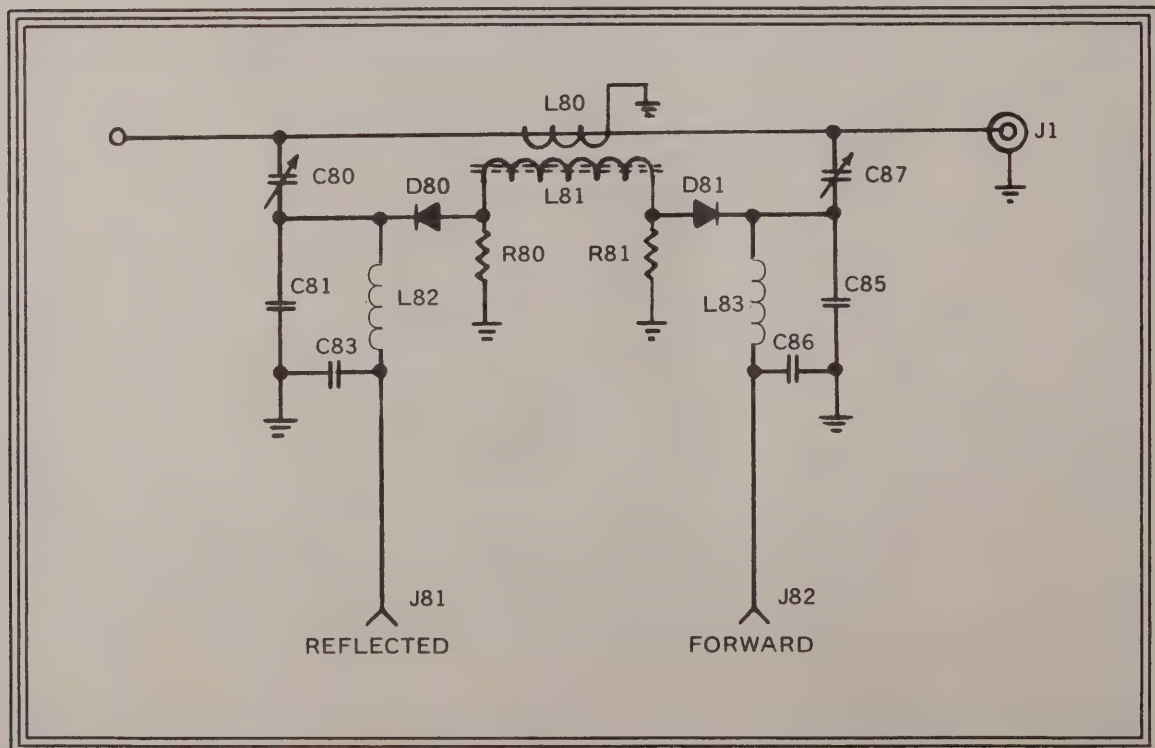


| SCHEMATIC NO. | DESCRIPTION   | NUMBER   |
|---------------|---|----------|
| SK2           | SOCKET: 6 pin male connector.   | 16 40600 |
| SWR           | SWR BRIDGE ASSEMBLY: See the bottom of the page.  | 56 11111 |
| T101          | TRANSFORMER: Filament, primary 220-230-240 V, secondary 10.25 V, 15 amp RMS.              | 84 76352 |
| T102          | TRANSFORMER: Relay and lamp, 220 V - 12 V.  | 84 76364 |
| T201          | TRANSFORMER: Power, primary — 230 VAC, secondary — 4000 VAC, 600 ma and 3000 VAC, 800 ma. | 84 70400 |
| TB101         | TERMINAL BOARD: Heavy duty 12 terminal, w/marker.   | 80 14212 |
| TB102         | TERMINAL BOARD: Heavy duty 8 terminal, w/marker.  | 80 14208 |
| Tube Sockets  | 5 pin socket, with ventilating holes, for 3-500Z tubes.                                   | 89 22275 |
| V1 and V2     | ELECTRON TUBE: 3-500Z high mu power triode.   | 88 03500 |

## SWR BRIDGE PARTS LIST

|             |   |          |
|-------------|---|----------|
|             | The parts listed below can be ordered seperately as replacement parts for the SWR Bridge.     |          |
| C81         | CAPACITOR: Silver mica, .01 mf, 500 WVDC, 5%.   | 08 30103 |
| C84         | CAPACITOR: Silver mica, 500 pf, 500 WVDC, 5%.   | 08 15501 |
| C85         | CAPACITOR: Silver mica, .01 mf, 500 WVDC, 5%.   | 08 30103 |
| C86         | CAPACITOR: Ceramic disc, .01 mf, 600 WVDC, GMV.   | 08 06103 |
| D80 and D81 | DIODE: Germanium, type 1N34, 100 PIV, 800 ua rev., 8.5 ma.                                    | 73 00034 |
| J1          | ANTENNA CONNECTOR: Type SO-239  | 16 00239 |
| R80 and R81 | RESISTOR: Carbon, 20 ohm, 1 watt, 10%.  | 68 20200 |
|             | The remaining parts can only be ordered as an assembled SWR-Bridge with the following number: |          |
| SWR         | SWR BRIDGE ASSEMBLY   | 56 11111 |

## SWR BRIDGE SCHEMATIC





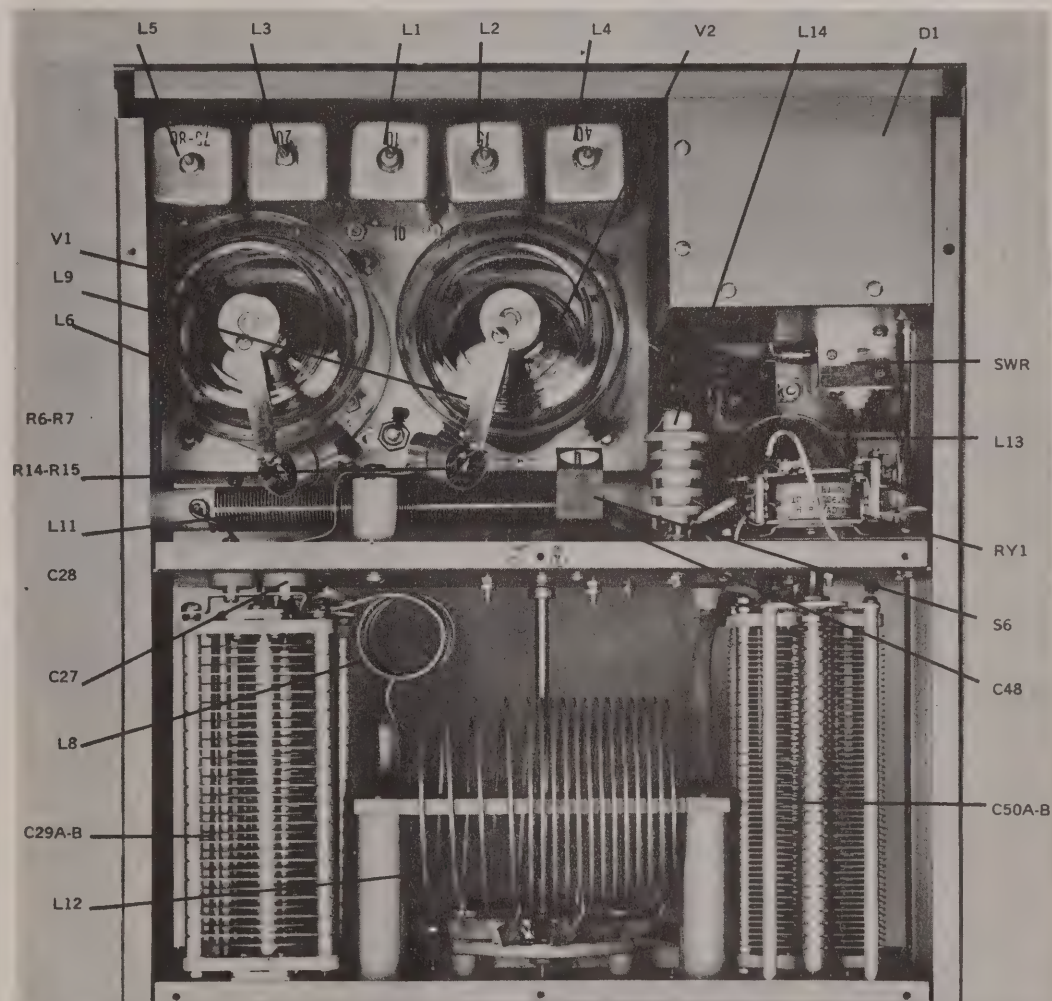
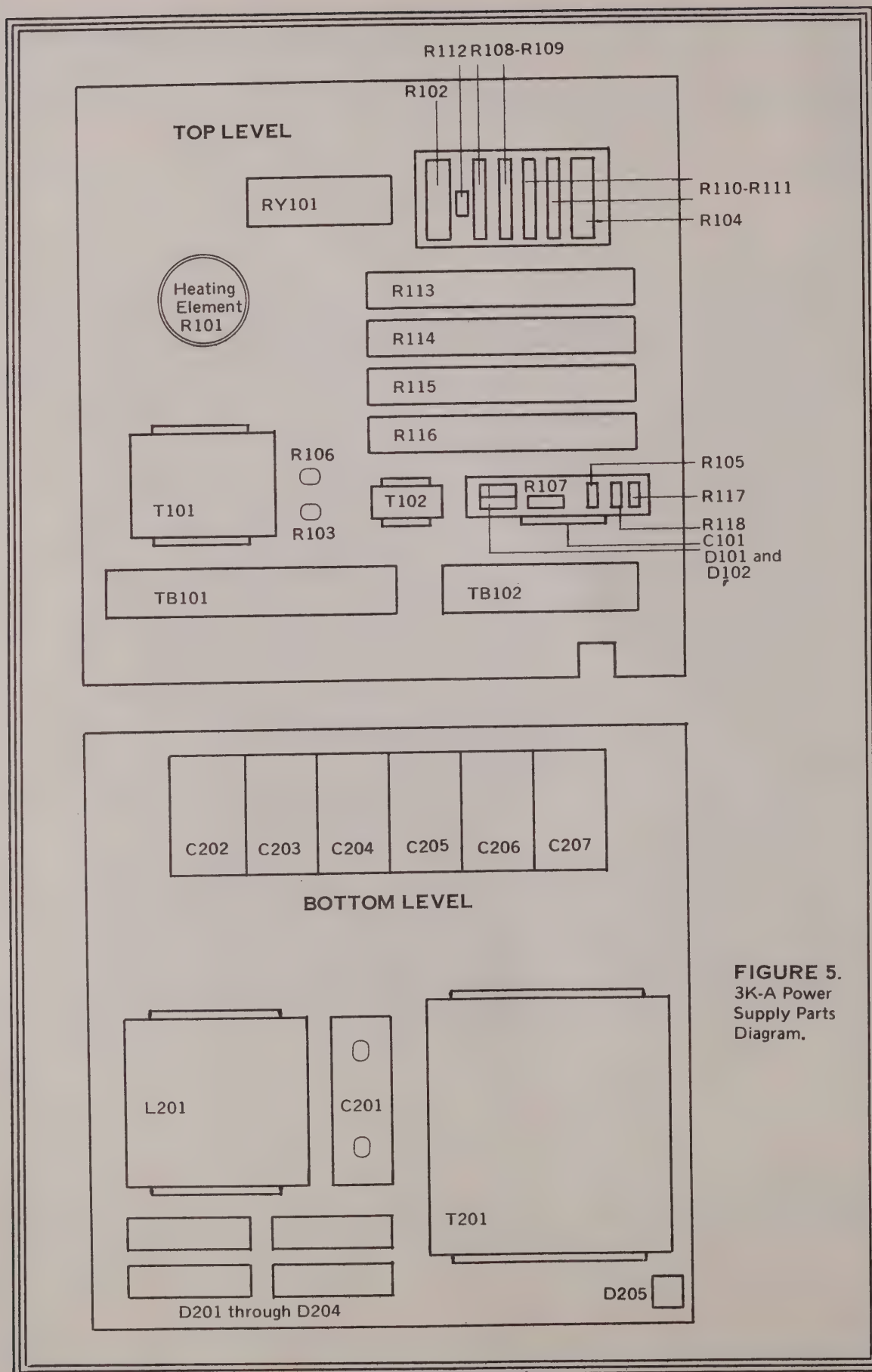


FIGURE 4. 3K-A RF Deck.





**FIGURE 5.**  
3K-A Power  
Supply Parts  
Diagram.



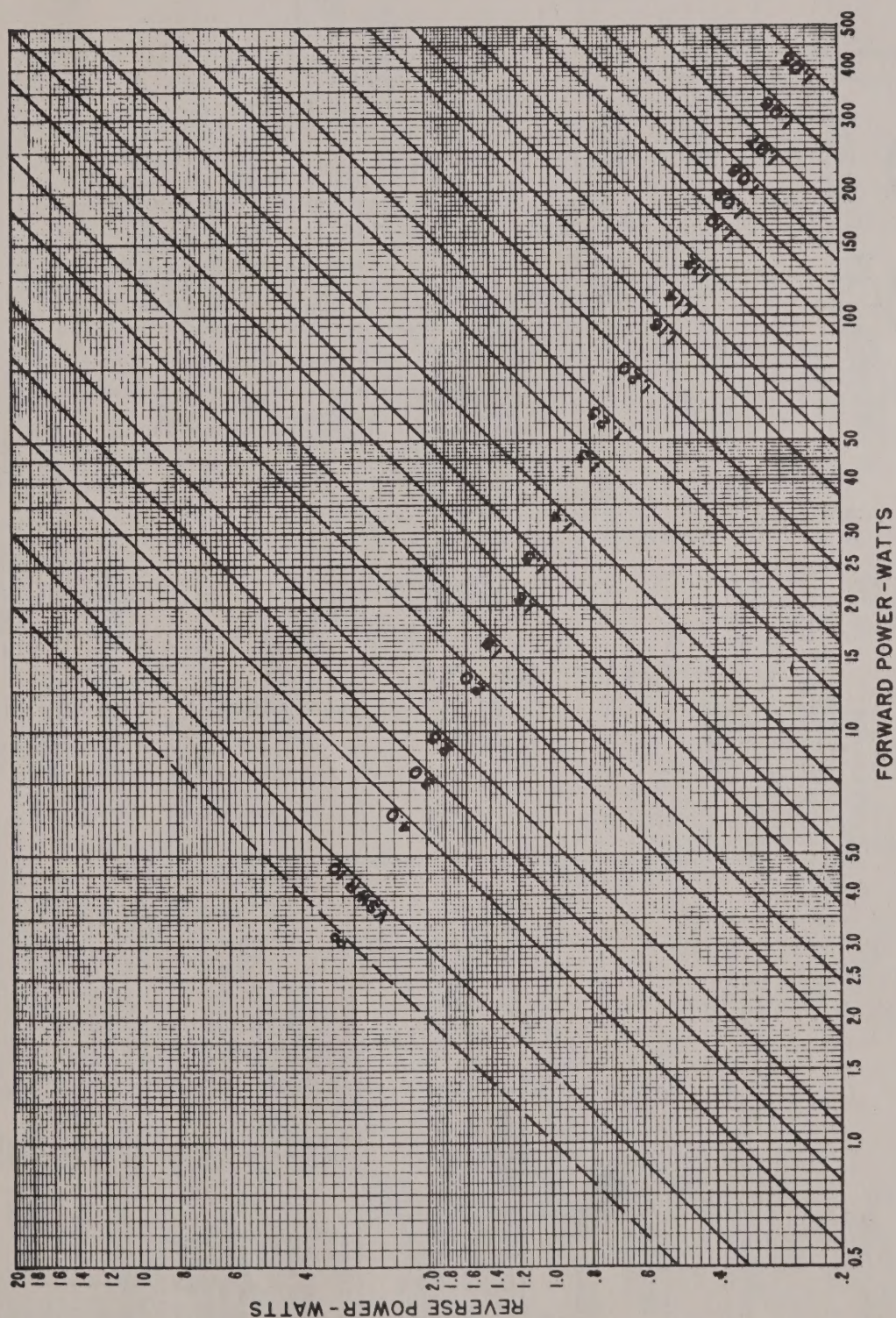
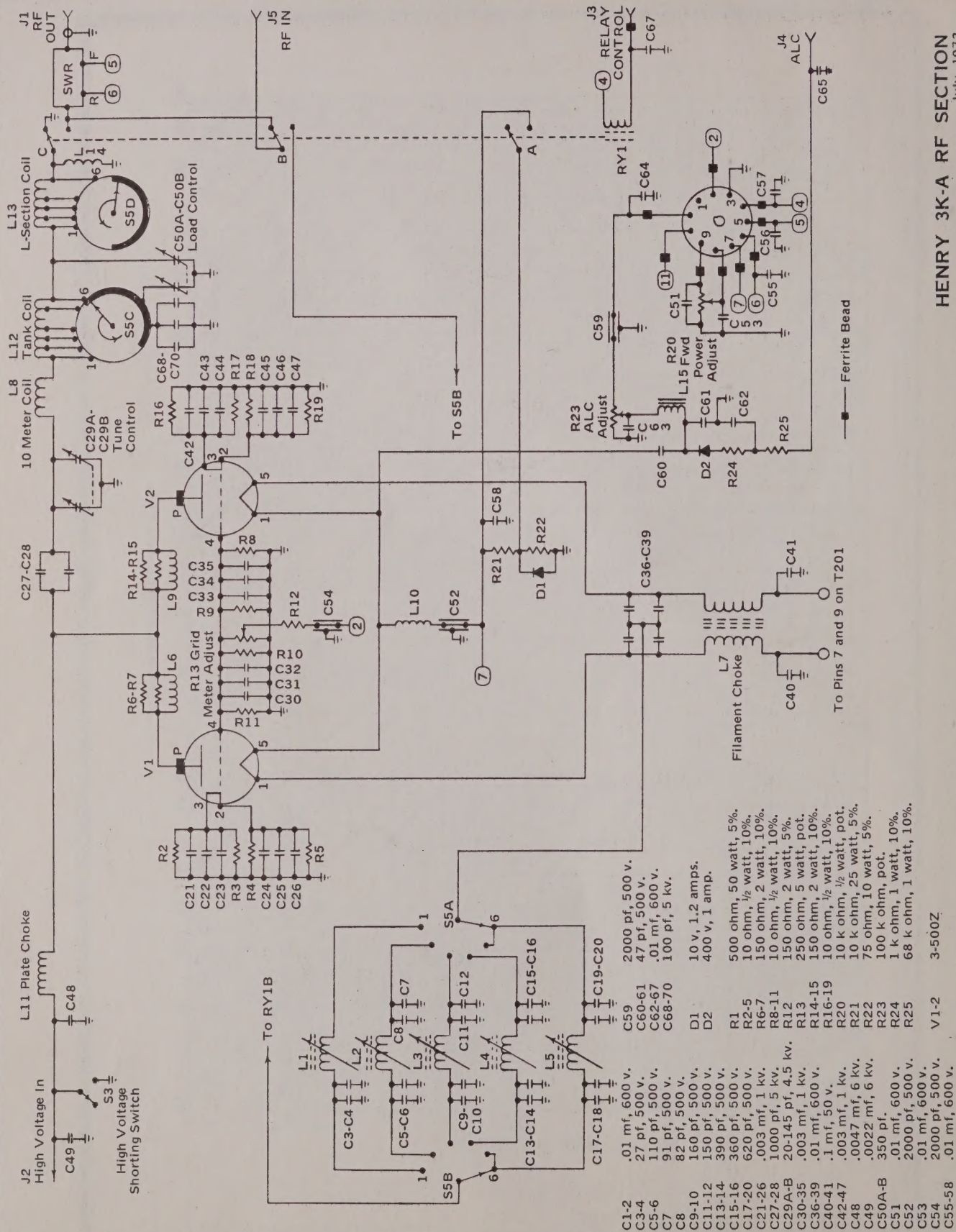
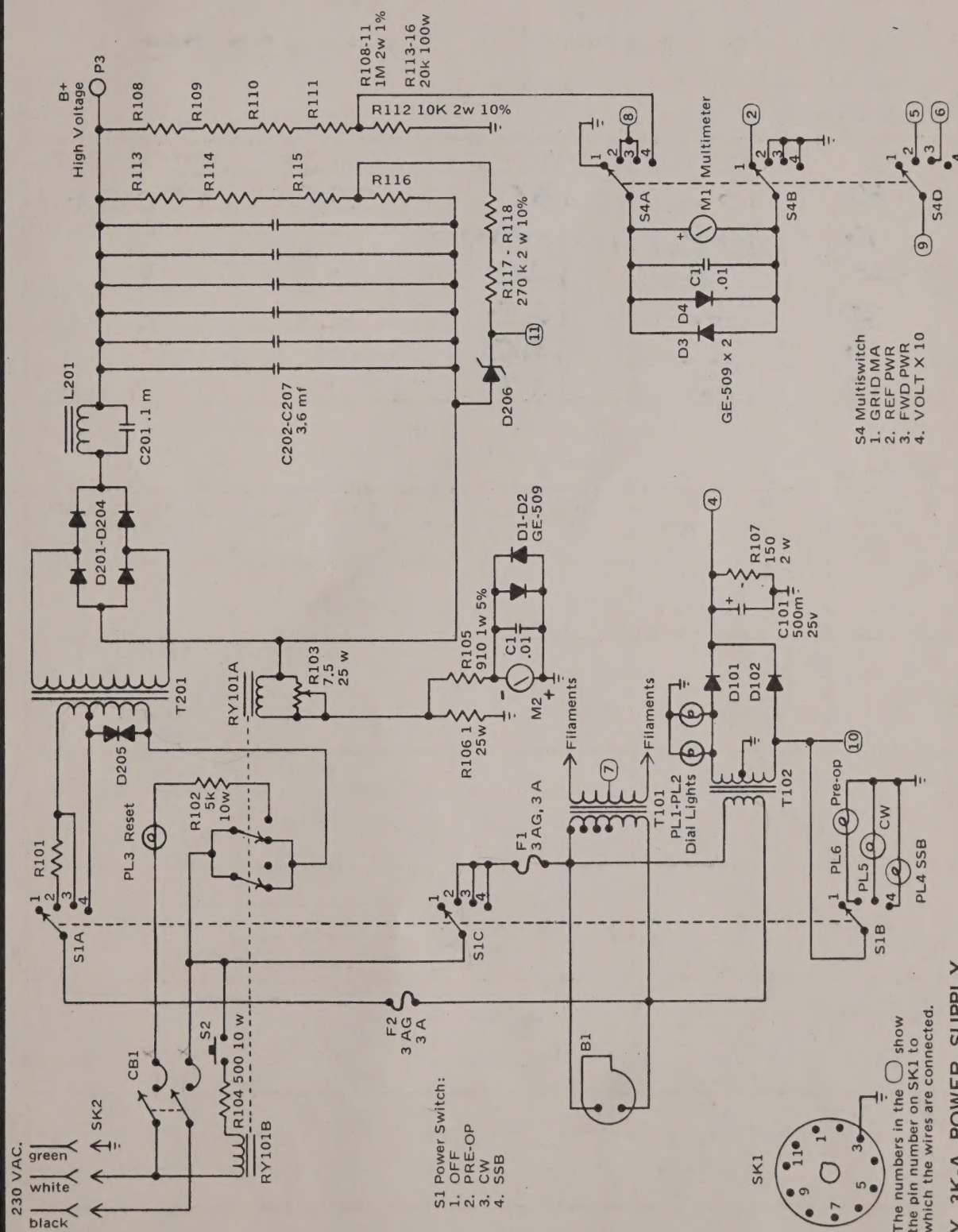


FIGURE 6. Power Values vs. VSWR









HENRY 3K-A POWER SUPPLY

February 1973

TABLE 2. TUNE AND LOAD SETTINGS.

Serial Number 03-344

These are approximate settings for a 52 ohm load.

## FACTORY DATA

 $I_p = 800 \text{ ma}$ 

| BAND | TUNE DIAL | LOAD DIAL | GRID MA | OUTPUT WATTS |
|------|-----------|-----------|---------|--------------|
| 6 80 | 136       | 130       | 280     | 1000+        |
| 5 75 | 149       | 135       | "       | "            |
| 4 40 | 78        | 140       | "       | "            |
| 3 20 | 46        | 165       | "       | "            |
| 2 15 | 22        | 140       | "       | "            |
| 1 10 | 16        | 117       | "       | "            |

## USER DATA

| BAND | TUNE DIAL | LOAD DIAL | GRID MA | OUTPUT WATTS |
|------|-----------|-----------|---------|--------------|
| 6    |           |           |         |              |
|      |           |           |         |              |
|      |           |           |         |              |
| 5    |           |           |         |              |
|      |           |           |         |              |
|      |           |           |         |              |
| 4    |           |           |         |              |
|      |           |           |         |              |
|      |           |           |         |              |
| 3    |           |           |         |              |
|      |           |           |         |              |
|      |           |           |         |              |
| 2    |           |           |         |              |
|      |           |           |         |              |
|      |           |           |         |              |
| 1    |           |           |         |              |
|      |           |           |         |              |
|      |           |           |         |              |